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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/824,074	04/02/2001	Stephen J. Dovey	99B156	8499

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The BOC Group, Inc.  
Intellectual Property Department  
100 Mountain Avenue  
New Providence, NJ 07974

EXAMINER

GRAY, MICHAEL KUHN

ART UNIT	PAPER NUMBER
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3746

DATE MAILED: 12/12/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

# Office Action Summary

Application No.

09/824,074

Applicant(s)

DOVEY ET AL.

Examiner

Michael K. GRAY

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

## Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☐ Responsive to communication(s) filed on \_\_\_\_.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 1-8 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-8 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☒ The proposed drawing correction filed on 15 November 2002 is: a) ☒ approved b) ☐ disapproved by the Examiner
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

## Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

## Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) \_\_\_\_.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). \_\_\_\_.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_.

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## **SECOND DETAILED ACTION**

### ***Background***

Claims 1-8 remain pending in the application. Claim 1 has been amended as a result of the Amendment filed on November 15, 2002.

(The print appearing in the Amendment filed November 15, 2002 appears to be single-spaced. The lines of print in Amendments filed with the USPTO should be at least 1.5 spaces apart and preferably double spaced for easier readability.)

### ***Drawings***

The proposed drawing correction filed with the Amendment received November 15, 2002, has been approved.

### ***Specification***

The changes made to the specification in the Amendment received November 15, 2002, have been entered.

### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

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Claims 1-8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yang (6,176,683).

Yang teaches a linear compressor, necessarily having a cylinder with opposed ends, wherein a piston reciprocates (col. 4, lines 42+).

Drive means 900 are connected to the piston for reciprocating movement of the piston.

Sensor means 500, 600 are in communication with the cylinder for sensing contact of the piston and either of the opposed ends and generating a contact signal representing the contact.

Control means 700 interconnect the sensor means and drive means with the control means receiving a first signal from the control means (representing contact with the cylinder) and then generating a second signal to the drive means 900 which controls movement of the piston.

The sensor means and drive means comprise a close-looped system.

The driving means 900 outputs a voltage driving signal (col 3, lines 31+).

The sensor 500 is mounted to the exterior of the compressor cylinder 400. Figure 1.

The sensor is a piezo-type sensor (col. 5, line 50).

It is typical in the art for a compressor's piston cylinder to be provided with a suction valve and/or discharge valve at least at one end of the cylinder to allow the fluid or gas which is to be compressed to enter and escape from cylinder. That the collision detection sensor 500 detects a collision between the piston and the discharge valve would indicate to one of ordinary skill that a sensor or detection means is positioned proximate to the discharge valve.

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Accordingly, one of ordinary skill in the art would have recognized from a reading of Yang that the sensor could be proximate to the discharge valve in a location just to the outside or exterior of the piston cylinder. Yang controls movement of the piston by voltage control which drives the compressor in accordance with the stroke determined by the microcomputer. (column 3, lines 45-50).

As for claim 7, Yang teaches a linear compressor whereas claim 7 claims a vacuum pump.

It would have been obvious to anyone of ordinary skill in the art that the sensor and control system of Yang could have been applied to any pump or compressor system having a piston which reciprocates in a cylinder.

Further, it would have been obvious to one of ordinary skill that if collision detection sensors are positioned at one end of a cylinder, if so desired such detection devices could be applied to both ends of a piston cylinder. (It is noted, the sole drawing figure of the present application depicts a single vibration sensor 3 at a single end 6 of a piston cylinder 1).

Claims 1-8 are further rejected under 35 U.S.C. 103(a) as being unpatentable over Matsumura et al. (JP 11-324911) in view of Yang (6,176,683).

As for claims 1-6 and 8, Matsumura et al teach a control device for a linear compressor for preventing collision of a piston with the end wall of a cylinder.

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Control means 5, 6 are connected to a sensor 4 with the control means 5, 6 being connected to a linear motor drive 3 which drives the piston.

As a result of the examiner's consultation with the USPTO translation branch, the examiner has learned that Matsumura et al include a teaching that the sensor device therein can be "a MR sensor (magnetoresistive), a laser sensor, a differential transmission sensor or the like".

Yang teaches a piezo sensor means. In light of the purpose of Matsumura et al, i.e., to eliminate collision of a piston with the end wall of a cylinder, and in light of the fact that Matsumura et al teach that any number of sensors could be employed to achieve this purpose, it would have been obvious in light of Yang that a piezo sensor could be used in the closed system of Matsumura et al.

Accordingly, it would have been obvious that the control means and drive means of Matsumura could be utilized with a piezo sensor with the sensor imparting a signal to the control means and the control means imparting a signal to the drive means such that an appropriate current is applied to the linear motor to cause a desired reciprocation of the piston.

As for claim 7, it would have been obvious to anyone of ordinary skill in the art that the sensor and control system of Matsumura et al could have been applied to any pump or compressor system having a piston which reciprocates in a cylinder.

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***Response to Arguments***

The applicants have argued that the Yang reference does not teach that the sensor or detection means is positioned inside a compressor or is capable of sensing ‘any’ contact with the ends of the cylinder. As stated above, compressors employing pistons as the pumping means typically have discharge valves positioned proximate to the end of the piston cylinder to allow fluid to exit. A detection device or sensing means as taught by Yang would thus be connected to the discharge valve at a location proximate the end of the piston cylinder.

If a sensing or collision detection device is taught at one end of a cylinder, it would suggest to those of ordinary skill that a second device could be located at the other end of the piston cylinder (e.g., double-headed pistons would typically have discharge valves at both ends of the cylinder). (It is noted, the sole drawing figure of the present application depicts a single vibration sensor 3 at a single end 6 of a piston cylinder 1) .

Regarding, claim 8, the applicants argue that Yang does not teach a control means which interconnects the sensor means and the driver. However, Yang does demonstrate a microcomputer or control means 700 which interconnects the collision detection sensor 500 and the driving unit 900.

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As for the rejection of claims 1-8 as being unpatentable over Matsumara et al. in view of Yang, the applicants argue that a collision sensor or contact sensor is not taught by Matsumara et al., but rather a position detection circuit. A position detection circuit would serve the function of determining if contact with the piston and the end region of the piston cylinder had been made. Furthermore, it would have been obvious to utilize the circuitry taught by Matsumara et al. with a piezo-type sensor as taught by Yang to control piston position by the voltage or current applied to the driving means.

Applicants' amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.



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***Communication***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Michael Gray whose telephone number is (703) 308-6196.

If the examiner does not answer the phone, a message will be provided as to when he will be in the Office. A message can be left by the caller on the Examiner's voice mail.

Dialing zero will give the caller further options. The examiners's supervisor Timothy Thorpe can be reached at (703) 308-0102.

The Official Fax Number is (703) 872-9302. The number for After Final Faxes is (703) 872-9303. Please indicate the application's serial number, art unit and examiner's name on the cover sheet. A call to the examiner indicating a fax is being sent will expedite the processing of the faxed material. Any inquiry of a general nature should be directed to the receptionist whose telephone number is (703) 308-0861.

/Michael K. Gray

  
**Patent Examiner Art Unit 3746**

  
CHARLES G. FREAY  
PRIMARY EXAMINER